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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/034,316	12/28/2001	Hisashi Tsukamoto	Q130-US1	8911

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EXAMINER

TSANG FOSTER, SUSY N

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 02/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/034,316	Applicant(s) TSUKAMOTO, HISASHI	
	Examiner Susy N Tsang-Foster	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE three MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 December 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All   b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>3</u> . | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement filed on 12/23/2002 has been considered by the Examiner.

The EP 0807986 reference was initially not considered by the Examiner since the information disclosure statement had failed to fully comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language.

However, the Examiner searched EP 0807986 on the Derwent Database and found that US 5,916,708 is the equivalent document for EP 0807986 A. The EP 0807986 reference has been considered by the Examiner by relying on the US equivalent document that was also cited in the Information Disclosure Statement. The Examiner cites the European reference in the 892 form.

### ***Specification***

2. The abstract of the disclosure is objected to because "perfluoralkyl" and "perfluorether" should be "perfluoroalkyl" and "perfluoroether". Correction is required. See MPEP § 608.01(b).

3. The disclosure is objected to because of the following informalities:

On page 4, line 7, "perfluorether" should be "perfluoroether".

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Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 14 and 17 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for perfluoro-1,3-dimethylcyclohexane and  $C_{15}F_{33}N$  as the halogen compound that is a flame retardant material that is liquid at room temperature and pressure and substantially immiscible in the non-aqueous electrolyte solution, does not reasonably provide enablement for all halogen containing compounds that are flame retardant materials that are liquid at room temperature and pressure, substantially immiscible in the nonaqueous electrolyte solution, and contain at least one member selected from the group consisting of branched or unbranched alkyl, cyclic alkyl, ether, aminoalkyl, perfluoroalkyl groups, perfluoroaminoalkyl groups, and pefluoroether groups, and aliphatic heterocyclic compound groups in which one or more hydrogen atoms are substituted by a halogen selected from the group consisting of fluorine, chlorine, and bromine. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

The specification provides only the above 2 examples of halogen containing compounds that are flame retardant materials that are liquid at room temperature and pressure, and substantially immiscible in the nonaqueous electrolyte solution. It would be undue

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experimentation to one of ordinary skill in the art to determine what halogen containing compounds are encompassed by the claims that contain branched or unbranched alkyl, cyclic alkyl, ether, aminoalkyl, perfluoroalkyl groups, perfluoroaminoalkyl groups, and perfluoroether groups, and aliphatic heterocyclic compound groups in which one or more hydrogen atoms are substituted by a halogen selected from the group consisting of fluorine, chlorine, and bromine that are flame retardant materials that are liquid at room temperature and pressure, and substantially immiscible in the nonaqueous electrolyte solution. The specification does not provide sufficient guidance as to what halogen compounds would contain the groups cited in the Markush group above and are flame retardant materials that are liquid at room temperature and pressure, and substantially immiscible in the nonaqueous electrolyte solution.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 10, 17, and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 10, the limitation “wherein the cyclic carbonate contains alkylene group with 2 to 5 carbon atoms and the linear carbonate contains a hydrocarbon group with 1 to 5 carbon atoms” is indefinite because it is unclear whether the non-aqueous solvent includes both or one of the cyclic carbonate and linear carbonate. Claim 10 does not recite either the cyclic carbonate

or the linear carbonate to be chosen from the Markush group of claim 9 to be in the non-aqueous solvent.

In claim 22, the limitation “wherein the metal oxide is selected from the group consisting of tin oxide and titanium oxide” is indefinite because it is unclear whether the negative electrode material contains either tin oxide or titanium oxide. Claim 22 does not recite that the metal oxide be chosen from the Markush group of negative electrode materials and claim 22 only recites what the metal oxide material can be.

Claims depending from claims rejected under 35 USC 112, second paragraph are also rejected for the same.

### *Claim Rejections - 35 USC § 102*

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1- 9, 11-15, 20, 21 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Narang et al. (US 5,830,600) and as evidenced by Galden PFPE:Heat Transfer Fluids Product Data Sheet for Galden ® HT90 Fluid pp. 1-3 (obtained [online]. Solvay Solexis, Inc., 2002 [retrieved on 2003-02-23]. Retrieved from the Internet : <URL:

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[www.solvasolexis.com/pdf/gald\\_heat.pdf](http://www.solvasolexis.com/pdf/gald_heat.pdf) ) and Data sheet for Ethylene Carbonate obtained from Chemfinder.com (obtained [online]. CambridgeSoft Corporation, 2003 [retrieved on 2003-02-23]. Retrieved from the Internet: <URL: [www.chemfinder.cambridgesoft.com/result.asp](http://www.chemfinder.cambridgesoft.com/result.asp)>).

Narang et al. disclose a battery comprising a lithium metal anode, a  $\text{LiMn}_2\text{O}_4$  cathode and a fire-retardant electrolyte composition comprising perfluoropolyether Galden ® HT90 (formula weight=460) and ethylene carbonate (col. 22, lines 25-35) in a 1:1 volume ratio and lithium bis(trifluoromethane-sulfonate) imide as the electrolyte salt (col. 20, lines 50-60).

The Galden PFPE:Heat Transfer Fluids Product Data Sheet for Galden ® HT90 Fluid shows that the perfluoropolyether Galden ® HT90 is a fluid that is not substantially miscible with water (see page 2) where the solubility of water is 14 ppm. The data sheet also shows that the density of the fluid is  $1.69 \text{ g/cm}^3$  at room temperature (see page 2).

Furthermore, the lithium salt in the fire retardant electrolyte composition may also be  $\text{Li-A}$  where A is an anion selected from the group consisting of  $\text{Cl}$ ,  $\text{CF}_3\text{SO}_3$ ,  $\text{ClO}_4$ ,  $\text{BF}_4$ ,  $\text{Br}$ ,  $\text{I}$ ,  $\text{SCN}$ ,  $\text{AsF}_6$ ,  $\text{N}(\text{CF}_3\text{SO}_2)_2$ ,  $\text{PF}_6$ ,  $\text{SbF}_6$ ,  $\text{O}(\text{CO})\text{R}'$  where  $\text{R}'$  is H, alkyl, aryl, alkenyl, halo, and haloalkyl, and the solutions of the lithium salt in fire retardant solvents are prepared to achieve approximately 0.2 M to 2.0 M lithium (col. 10, lines 17-27).

It is noted that applicants interchangeably used the weight percentage of the halogen compound based on either the weight of the electrolyte solution (page 17, lines 3-9 of the specification) or the weight of the nonaqueous solvent as claimed. It appears from the example given on page 17 of the specification that the basis of the weight percentage for the halogen compound is the weight of the electrolyte solution, not the weight of the nonaqueous solvent.

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The data sheet for ethylene carbonate shows that the density of ethylene carbonate is  $1.321 \text{ g/cm}^3$ . When the concentration of the lithium salt  $\text{LiN}(\text{CF}_3\text{SO}_2)_2$  is 2.0M in Example 16 (see col. 22, lines 25-35), calculations show that the weight percentage of the halogen containing compound is 40.6% by weight based on the weight of the electrolyte solution.

In addition, a high dielectric solvent such as ethylene carbonate, propylene carbonate, dimethyl carbonate, diethyl carbonate, dipropyl carbonate, and mixture thereof may be used in the fire-retardant electrolyte composition (col. 11, lines 39-44).

Finally, anodes and cathodes of the battery may be fabricated from materials that are commonly used in primary and/or secondary batteries (col. 12, lines 42-44). The anode may be lithium metal, a carbon based material, and intercalating metal oxides and the cathode may be lithium containing materials such as  $\text{LiCoO}_2$ ,  $\text{LiMn}_2\text{O}_4$ ,  $\text{LiNiO}_2$ ,  $\text{V}_6\text{O}_{13}$ ,  $\text{MnO}_2$ , and  $\text{FeS}_2$  (col. 12, lines 42-51).

10. Claims 1- 9, 11-15, 20, 21 and 23 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by JP 10-012272 A (JPO Machine Translation).

See claims 1-6, and paragraphs 4-6, 13, 14, 17, 18, 20, 21, 24-31, and 42-44 of the JPO machine translation of the reference.

11. Claims 1- 9, 11-15, 20, 21 and 23 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Arai (US 6,210,835 B1).

See col. 3, lines 48-52; col. 4, lines 7-67; col. 5, line 14 to col. 6, line 64; col. 7, lines 6-42; col. 8, lines 1-8; col. 8, lines 20-50; Table 2, col. 14, lines 55-60 of the reference.



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***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narang et al. (US 5,830,600) and as evidenced by Galden PFPE:Heat Transfer Fluids Product Data Sheet for Galden ® HT90 Fluid pp. 1-3 (obtained [online]. Solvay Solexis, Inc., 2002 [retrieved on 2003-02-23]. Retrieved from the Internet : <URL: [www.solvaysolexis.com/pdf/gald\\_heat.pdf](http://www.solvaysolexis.com/pdf/gald_heat.pdf)> ) and Data sheet for Ethylene Carbonate obtained from Chemfinder.com (obtained [online]. CambridgeSoft Corporation, 2003 [retrieved on 2003-02-23]. Retrieved from the Internet: <URL: [www.chemfinder.cambridgesoft.com/result.asp](http://www.chemfinder.cambridgesoft.com/result.asp)>).

Narang et al. disclose all the limitations of claims 17-19 (see above) except filling the battery case at least partially with non-aqueous electrolyte solution, waiting a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing, and charging the energy storage device after adding the nonaqueous electrolyte solution. Instead, Narang et al. disclose impregnating the resin separator and the cathode with the flame retardant electrolyte composition prior to inserting the electrode assembly into the casing (col. 17, lines 15-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the nonaqueous electrolyte solution to the casing and wait for a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode

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assembly and then adding the flame retardant material to the casing instead of adding the nonaqueous electrolyte solution containing the flame retardant material to the casing in one step because the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to charge the energy storage device when the anode active material used is a carbon based material and the cathode active material is a lithium containing materials such as  $\text{LiCoO}_2$ ,  $\text{LiMn}_2\text{O}_4$ ,  $\text{LiNiO}_2$ ,  $\text{V}_6\text{O}_{13}$ ,  $\text{MnO}_2$ , and  $\text{FeS}_2$  (col. 12, lines 42-51) because the charging process is necessary to intercalate the anode with lithium from the cathode prior to using the battery as a portable energy source.

14. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-012272 A (JPO Machine Translation).

The JPO machine translation of JP 10-012272 A discloses all the limitations of claims 17-19 (see above) except filling the battery case at least partially with non-aqueous electrolyte solution without the flame retardant halogen containing compound, waiting a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing, and charging the energy storage device after adding the nonaqueous electrolyte solution. The JPO machine translation of JP 10-012272 A discloses adding the nonaqueous electrolyte solution containing the flame retardant halogen containing compound to the battery casing (see paragraph 42 of the machine

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translation). The JPO machine translation of JP 10-012272 A also discloses that the battery is charged after adding the nonaqueous electrolyte solution (see paragraph 44 of machine translation).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the nonaqueous electrolyte solution to the casing and wait for a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing instead of adding the nonaqueous electrolyte solution containing the flame retardant material to the casing in one step because the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

15. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arai (US 6,210,835 B1).

Arai discloses all the limitations of claims 17-19 (see above) except filling the battery case at least partially with non-aqueous electrolyte solution without the flame retardant halogen containing compound, waiting a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing.

Instead, Arai discloses adding the nonaqueous electrolyte solution containing the flame retardant halogen containing compound as the final electrolyte solution to the battery casing (col. 14, lines 55-61).

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the nonaqueous electrolyte solution to the casing without the flame retardant and wait for a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing instead of adding the nonaqueous electrolyte solution containing the flame retardant material to the casing in one step because the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

***Allowable Subject Matter***

16. Claim 16 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

17. The following is a statement of reasons for the indication of allowable subject matter:

The present invention claims an electrolyte system comprising an non-aqueous electrolyte solution that includes a non-aqueous solvent, a salt, and perfluoro-1,3-dimethylcylcohexane having a molecular formula of  $C_8F_{16}$ .

The closest prior art of record, JP 10-012272 A discloses a nonaqueous electrolyte system comprising a flame retardant having the formula  $F(CF_2)_a F$  where a is 5-8 (see paragraph 24 of JPO machine translation). When a is 8, the formula reduces to  $C_8F_{18}$ . The reference does not disclose, teach, or suggest perfluoro-1,3-dimethylcylcohexane as a flame retardant in the non-aqueous electrolyte system.

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***Conclusion***

18. Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (703) 305-0588. The examiner can normally be reached on Monday through Thursday from 9:30 AM to 8:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (703) 308-2383. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900.

The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9310 for regular communications and (703) 872-9311 for After-Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

st/23 February 2003

*Susy Tsang-Foster*